Shock Associated Periodicities

L. Kepko, NASA GSFC

The magnetosphere is often thought of as a cavity resonator, with eigenfrequencies dependent on the size of the magnetospheric cavity and the Alfven speed profile. A commonly invoked mechanism to "ring the bell" is a solar wind shock or dynamic pressure discontinuity. The sudden impulse feeds broadband compressional power into the magnetosphere, feeding energy into the cavity eigenmodes. Although the cavity mode model has strong theoretical and simulation support, there are few observations validating the scenario. We present several case studies indicating that damped oscillations observed in the magnetosphere following a shock are clearly directly driven by oscillations already present in the solar wind. We discuss these new observations in the context of the turbulent solar wind model, and discuss recent observations relating these periodicities to the solar surface. We further report on similar oscillations observed in magnetotail flow bursts, and relate them to the solar wind phenomena. We close with a discussion of the role of modulated magnetic reconnection, a potentially universal physical process.